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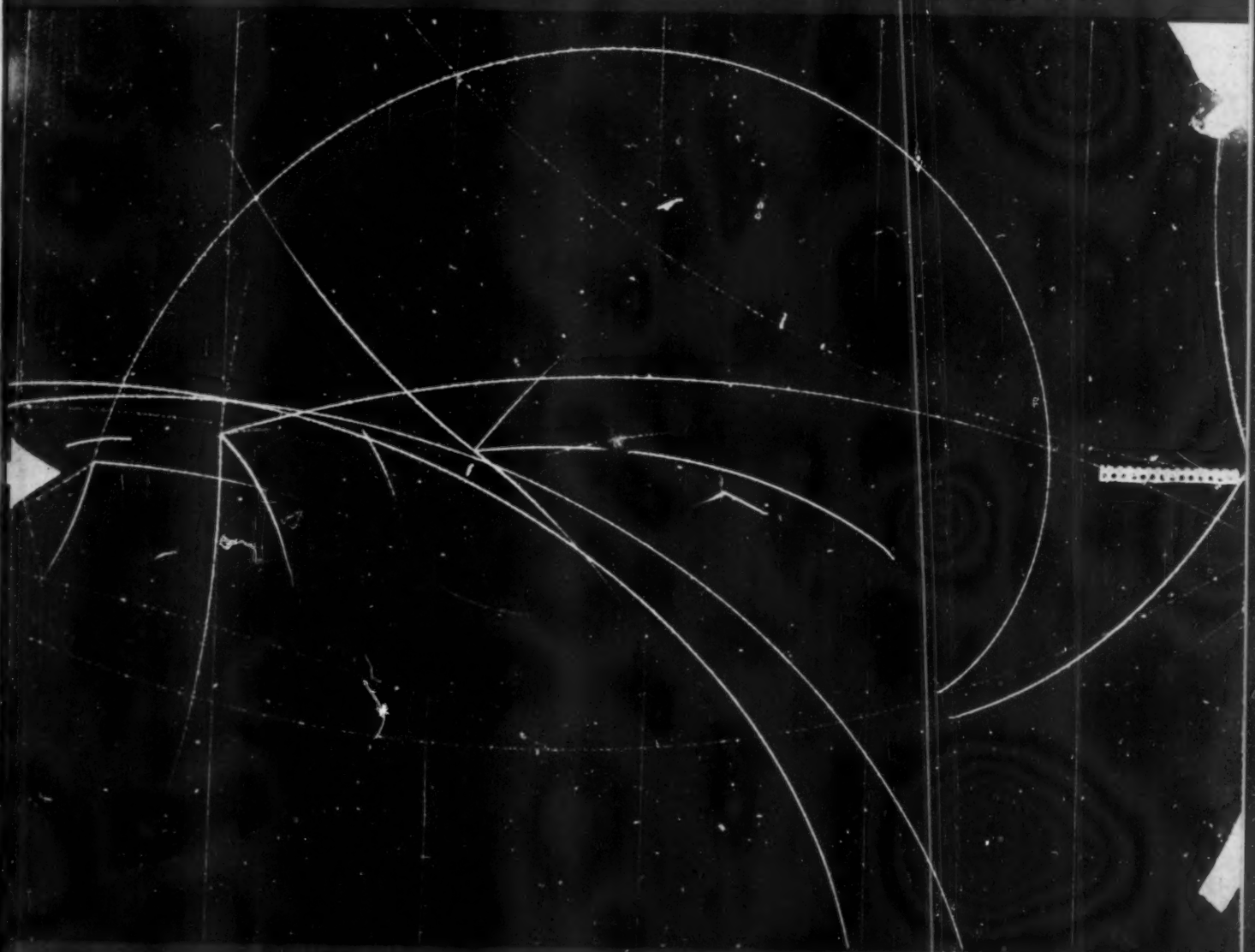
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • OCT. 25, 1947



Dr. Neutron and Mr. Proton

See Page 259

A SCIENCE SERVICE PUBLICATION

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NUCLEAR PHYSICS

Neutron Becomes Proton

Reverse action is also found in atom nucleus showing how the nucleus is held together by a subnuclear force differing from any known forces.

See Front Cover

➤ THE neutron (trigger of the atomic bomb and the proton (heart of the hydrogen atom), both fundamental particles in the nuclei of atoms, can turn one into the other.

This top discovery in man's invasion of the atomic nucleus was announced by Prof. Ernest O. Lawrence, Nobelist physicist of the University of California, who delivered the first Silliman lecture of Yale's Centennial Celebration of the Sheffield Scientific School at New Haven, Conn.

This research done with the new giant cyclotron at Berkeley gives direct evidence on the nature of the force that holds the nucleus together. It confirms for the first time a basic theory of atomic forces proposed by the German Dr. Werner Heisenberg in the early 1930's. Dr. Heisenberg headed Nazi atomic energy research during the war.

A new monster atom-smashing "bevatron" to attain 10 billion electron volts was also shown in preliminary design by Prof. Lawrence.

This Heisenberg theory, now confirmed, explained an anomaly of the nucleus. The elementary particles of the nucleus are protons, with a positive electrical charge, and neutrons, with no charge. If electrical laws alone were considered, the nucleus could not exist because protons would repel each other so forcibly when packed together in the nucleus that the atom would disintegrate.

Exchange Forces in Nucleus

Dr. Heisenberg proposed that, in addition to ordinary forces, there are "exchange forces" acting within the nucleus. For example, the charge on the proton, the theory holds, is tossed back and forth between the proton and neutrons, creating a subnuclear force differing from any known forces.

Prof. Lawrence said experiments at Berkeley proving this to be true were done by Drs. B. J. Moyer, J. Hadley, C. E. Leith, Harvey York and Wilson Powell. Interpretation of the results was done largely by Prof. Robert Serber and the theoretical staff of the Radiation Laboratory.

Two types of experiments were done, using the 100-million electron volt neutrons which are emitted from a target of beryllium bombarded by 200-million electron volt deuterons, the nuclei of heavy hydrogen atoms.

In the first experiment, the high energy neutrons were turned on a target of paraffin, which contains many atoms of hydrogen, the simplest of all nuclei, consisting of one proton.

Like Billiard Ball Collision

Prof. Lawrence likened this situation to a billiard ball collision. He said that the frequency with which the "cue ball" neutrons would strike the target protons a glancing blow and then continue at a slight angle in the same general direction can be calculated according to the laws of probability.

At varying angles away from the paraffin target a series of four radiation counters were placed, weak radiations being filtered out by the first three counters.

It was found that high energy protons were being emitted where ordinary mechanical laws would dictate that only neutrons could be.

The conclusion, Prof. Lawrence said, is that the neutrons, in the collisions, had picked up the charge of the protons. In Jekyll-and-Hyde fashion, the neutrons had become protons and the protons neutrons.

Cloud chamber photographs taken by Dr. Powell revealed the same thing. Neutrons cannot be photographed in a cloud chamber, but protons can. Protons suddenly starting up in the photographs took the same pattern of angles from the direction of neutron beam as they did in the other experiment. Thus it was concluded that the bombarding neutrons had been converted into protons in an exchange of charge.

The pictorial record of the latest advance in physics, appearing on this week's cover of the SCIENCE NEWS LETTER, is a cloud chamber photograph showing the disintegration of carbon and oxygen nuclei and the conversion of neutrons into protons under bombardment of 100 million electron volt neutrons from the giant University of California cyclotron.

MELTED BY RADIO—The investigator shown is measuring the temperature of thorium with a pyrometer while radio waves bombard it in a tubular high frequency melting chamber of the Westinghouse Lamp Research Laboratories. Thorium powder fuses at 3,600 degrees Fahrenheit.

Direction of the neutron beam is indicated by the arrow. Four "stars," the disintegrations of nuclei similar to those found in cosmic rays, are lined up in a row from a point directly to the right of the arrow to the right of the picture. The heavy tracks are made by alpha particles and protons emitted from the disintegrations. The long curving track is a 1.8 million electron volt proton.

Conversion of a neutron into a proton, demonstrated for the first time, is seen in three short tracks: first just above the right of the arrow; second, halfway between the second and third "stars"; and third, just to the right of the third star and crossing one of the tracks of that star.

Curvature of the tracks was produced by a magnetic field of 13,000 gauss.

For 15 years scientists have been trying unsuccessfully to prove Heisenberg's hypothesis. Low-energy cyclotrons did not give collision phenomena of sharp enough definition for conclusive proof.

Billions of Electron Volts

Prof. Lawrence said that the "bevatron" would have a magnet weighing 13,000 tons, and that its source of protons would be a Van de Graaff generator.

"Developments in atomic physics have been and are continuing to be so rapid and so fundamental in character as to

constitute truly a revolution in our understanding of the properties of matter," Prof. Lawrence said.

"We see that the production in the laboratory of accelerated particles in the 100 million electron volt range has opened up a rich domain for investigation. Perhaps, therefore, we should now be content to devote all our attention to the experimental attack on the problems in this field. But the very richness of the atomic phenomena already apparent in the 100 million electron volt level surely beckons us on to green pastures—the domain of billions of electron volts.

"It is, therefore, understandable that as soon as the synchrocyclotron was well launched on its operating career, W. M. Brobeck, who was chiefly responsible for the engineering design of the great machine, should give some thought to the next step up the energy scale.

"It did not take him long to reach the conclusion that it was well within the realm of practical feasibility to construct a great proton accelerator for the 10 billion electron volt level. Indeed, he has already completed preliminary engineering designs."

Prof. Lawrence did not indicate any immediate plans for the machine's construction.

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For other news from the Sheffield Centennial see pages 261, 262, 264.

PUBLIC HEALTH

War on Cholera Mapped

Quarantine experts, who just met in Geneva, planned strategy to stop cholera in Egypt and wipe out this disease, if possible, to prevent future outbreaks.

➤ IMMEDIATELY needed in Egypt's fight against cholera are 100 more ambulances to transport patients and suspected cholera victims to hospitals, Dr. Mohamed Nasis Bey, undersecretary of state for quarantine, Ministery of Health, Alexandria, reported to the World Health Organization's special committee on quarantine which met in Geneva.

The cholera epidemic in Egypt is essentially limited to rural areas, and rigorous control measures are being taken to prevent its further spread, Dr. Bey reported.

Measures to prevent importation of cholera into countries connected with Egypt by land, sea and air already taken by those countries are more rigorous, the WHO committee found to its surprise, than those recommended by international sanitary conventions and even more rigorous than the situation apparently calls for.

With hospitals in Egypt under virtual military control and travel there limited to official business, the world's chiefs of staff for epidemic control met to map further strategy in the war on this disease.

They had really two fights to plan. One is the immediate battle to stop cholera in Egypt and keep it from spreading to other parts of the world. The other is the war to wipe out this enemy, if possible, so there will be no future outbreaks to endanger world health. This war will be a long one, since it must involve improvements in sanitation in many parts of the world.

The possibility of cholera spreading to Palestine to add to that land's troubles is believed remote. So far, no cholera has been reported to the World Health Organization from either Palestine or Saudi-Arabia.

Reason for Egypt's military control over hospitals is to keep patients from leaving while they may still be discharging cholera germs in their body wastes. Steps must also be taken to find cholera carriers outside of hospitals and bring them under control.

Guards have been posted, as well as placards, to keep people from using water supplies that have been found contaminated with cholera germs.

Part of the million units of cholera vaccine being made available by China will be flown to Saudi-Arabia. It will be used to vaccinate the local population in and near Jidda, seaport where thousands of Moslem pilgrims converge during their trips to Mecca and other Holy cities in Arabia. The pilgrims are required to take cholera vaccination and other health safeguards before they are permitted to leave their homelands on these pilgrimages.

U. S. foreign quarantine regulations to prevent cholera getting into this country from abroad require that boats and planes take certain precautions before departure and while en route from regions where cholera exists. Not only must passengers be vaccinated, but luggage and any other articles shipped on the boat or plane must be inspected to make sure they are not contaminated. Sterilization of such articles may be required. Food and water supplies for the trip must be safe and food handlers must be instructed in proper precautions to avoid contamination. In case of doubt, water must be boiled and all food cooked. On arrival in this country, Public Health Service officers take over. They make sure that no case of cholera is aboard and that all have been vaccinated. If there is a case aboard, passengers and crew are held in quarantine for five days. This is the time it takes for cholera to develop.

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NUCLEAR PHYSICS

Hope To Detect Bomb Test

Study of radioactive clouds offers promise that American investigators may be able to detect the test explosion of an atom bomb in other parts of the world.

➤ IF SOVIET scientists have figured out a way to make atom bombs, would they be able to carry out the necessary single test explosion without our knowing it?

Assuming, as some Americans do, that the USSR will immediately attack the United States as soon as the Red Army has this most powerful of all weapons, Russian leaders would hardly be so reckless as to launch such a surprise assault without first making at least one test, just as we used up the first bomb built in the New Mexico test before we ventured to drop the next two on Hiroshima and Nagasaki.

This is because of the unique nature of the atom bomb. It does not explode because a primer and booster charge are fired in a mass of uranium 235 or plutonium. Atomic explosions take place when the amount of either of these fissionable elements in one chunk reaches a point where their spontaneous breakdown, or fission, produces neutrons sufficient to produce an almost instantaneous chain reaction. This spontaneously exploding quantity of the bomb element is called its critical mass.

An atom bomb is made by taking two chunks of uranium 235 or plutonium, each less than the critical mass, and suddenly thrusting them together into one mass that is above this critical explosion point. The mechanism of an atom bomb must therefore be quite different from that of an ordinary TNT bomb; and that is why the Russians would have to make a test if they succeeded in producing a bomb of their own.

They might do as we did during the war: make all preparations with the greatest secrecy, not tell anyone when or where the test was made, and trust that the effects could never be detected. But we had the advantage then of almost total unpreparedness by even our enemies for such a test. With all the world shivering in fear of the possibility of a new war, such relatively easy secrecy will not be attainable.

On the other hand, Russia diplomats and military men might attempt to run a colossal bluff: tell the world boldly that they possessed an atom bomb and had made the necessary test.

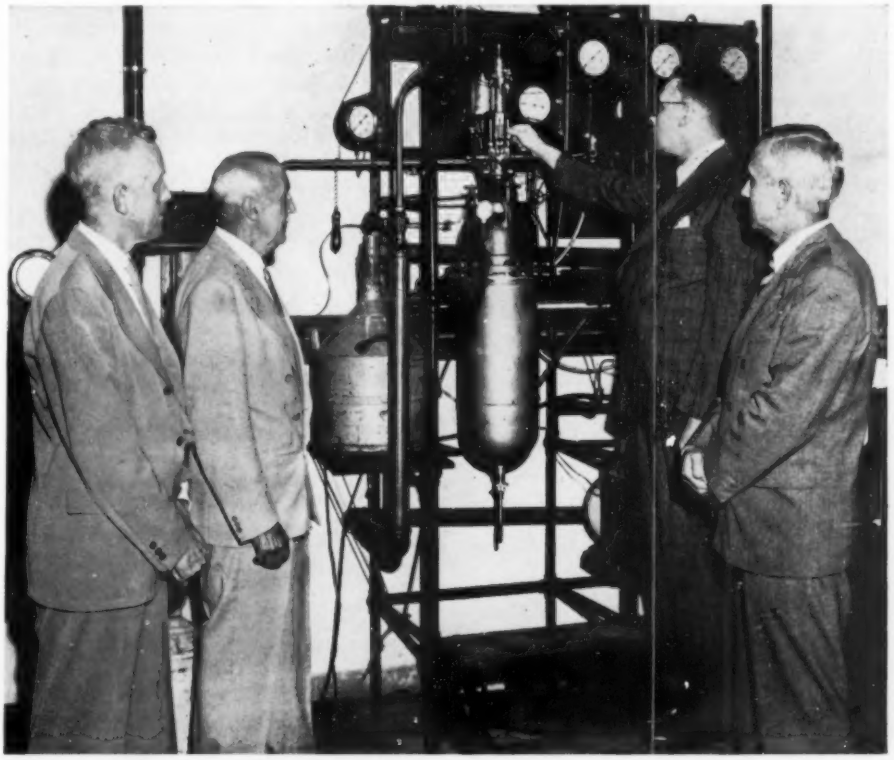
Is there any way for outsiders to get at the facts, in spite of the security precautions which the Soviet leaders could naturally be expected to take in their own interest?

Disregarding possible use of "orthodox" methods of espionage, what are the scientific methods that might be used to detect a test explosion of an atom-bomb a long way off?

Principal methods suggested are three: seismic, or check on the earthquake-like waves in the earth started by such a giant explosion; microbarographic, or detection of a pressure-wave in the air; radiometric, or spotting of the spreading cloud of atomic fragments by their electrical charges.

Least promising, probably, is the seismic method. True, the jar of the Alamogordo test was detected by a few earthquake observatories, but these were less than 300 miles away; more remote instruments, even in the United States, showed no trace of it. Neither did the underwater explosion at Bikini record itself on any seismographs except those especially installed on the atoll itself.

Use of the microbarograph, which is an instrument built to record exceedingly minute changes in air pressure, does not look much more promising. True again, such an instrument in England did record the fall of a great meteorite in Siberia in 1908. However, this immense missile from outer space released more destructive energy than a hundred or more atom bombs all at the same place in the same instant. If Soviet scientists were to explode a mere single atom bomb in the same place (which would be a pretty good one for the purpose) or in the deserts of southwestern Asia (which might be better) it is rather unlikely that its pressure-wave would be detectable by microbarographs outside the boundaries of the USSR.



LIQUID HELIUM MACHINE—Being examined in the Sloane Physics Laboratory at Yale, where temperatures approaching absolute zero have been reached, by, left to right: William W. Watson, chairman of the Yale Physics Department; President Charles Seymour of Yale; Cecil T. Lane, associate professor of physics in charge of liquid helium experimentation; and Edmund W. Sinnott, director of the Sheffield Scientific School and the University Division of Sciences.

That leaves the possibility of learning that an atom bomb explosion has taken place by electroscopes — highly sensitive instruments that can detect the impact of even one electrically charged particle, and would be certain to show the passing of a big cloud of them, such as made up much of the ominous mushroom-shaped clouds that rose over Alamogordo, Hiroshima, Nagasaki and Bikini.

These clouds dissipated, became invisibly thin; yet myriads of charged particles remained relatively close together, as compared with the sparse scattering of such particles that are normally present in the air all the time. The critical question is: Would the cloud still be thick enough, after drifting half-way around the world, to be recognized by these means?

Testimony is conflicting. After "Able" day at Bikini, the most nearly comparable test, so far as distance is concerned, several operators of such instruments, notably in California, Oklahoma and Texas, reported finding traces of the drifting charged cloud in their records. Other observers denied this; and their numbers included some of the world's leading physicists in parts of the world as widely separated as the United States, Peru and Australia.

There is one additional piece of negative evidence. In May, 1946, 40 days after the New Mexico test explosion, the Eastman Kodak Company had some X-ray film fogged by contact with strawboard that had become radioactive, presumably as a result of contamination by the northeastward-drifting cloud of atomic debris; either the straw used as raw material or the water used in processing had been affected. Carefully prepared "atom-traps" of cotton were exposed for 60 days after the first Bikini blast at various points in the United States and over the Pacific area as far out as Manila and Melbourne. Measurement of radioactivity "showed such low values as to be without definite significance as to dissemination of radioactive dust" from Bikini.

Distribution of the places where these tests were made, both electroscopic and photographic, was haphazard rather than scientifically planned. Observers simply checked up on their electroscopes wherever their laboratories happened to be; the cotton "atom-traps" were merely distributed to the principal Eastman branch offices, with instructions for their quite simple operation. If a systematic study had been undertaken of the possibility of recording a long-range drift of the radioactive cloud fragments, there would have been more observatories, preferably on mountaintops, on the Pacific coasts of North and South America, and probably some in the East Indies, the Philippines and Japan, but fewer at inland points.

Moreover, it is probable that for making a special test of the atmosphere, to find out if anybody has been setting off atom bombs secretly, a type of instrument somewhat different from existing electroscopes might be desirable. Certainly arrangements would be made to send lightweight instruments aloft by plane or free balloon, with robot radio sets to signal back to earth what they might find in the upper atmosphere.

If we want to sniff the stratospheric air for radioactive evidence of possible secret Soviet bomb tests, the likeliest places for high-altitude ground observatories, as well as for radio-robot balloon launching stations, would seem to be central and northern Japan, the Aleutians, and mainland Alaska. That is where winds blowing out of Russian Asia first flow over American-controlled land.

Would instruments so used tell of an atom-bomb explosion somewhere in interior Asia? On the basis of the conflicting evidence here reviewed, the answer cannot be better than "maybe." And if the U. S. Department of National Defense has better instruments and more advanced plans, naturally they aren't telling.

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CHEMISTRY

New Germ-Fighting Drugs

Scientists are beginning to understand "chemical kinetics," which promise to allow them to design and then to build substances that will block bacterial growth.

➤ NEW disease-fighting chemicals, tailor-made by scientists out of the cloth of more detailed knowledge of the structure of living matter, will result from the researches that Dr. Linus C. Pauling, California Institute of Technology chemist, described in his Silliman lecture at New Haven, Conn. as a part of the centennial of Yale's Sheffield Scientific School.

Whether a drug will successfully combat an invading germ is largely dependent upon whether the drug can be made more attractive to the germ than the living cell being attacked.

Dr. Pauling, digging into the matter of the molecules involved, finds that the antigen (the germ factor) and the antibody (the germ-fighting factor) interact with each other because they fit into each other in structure. A large portion of the surface of one can be brought into juxtaposition with the surface of the other molecule. Such closeness allows the weak forces operating between them to create an effective bond. Thus the drug can counteract the germ.

The exciting thing about this scientific research is that the scientists have the beginnings of knowledge of what is called "chemical kinetics" which promise to allow them to design and then to build chemical substances that will block the activities of bacterial and virus growth. Years may elapse between the fundamental research and the application to actual sick people but the way to success seems to have been found.

The nature of living matter itself is being better understood. Dr. Pauling explained that a substance called a catalytic enzyme allows the living cell to carry out any specific reactions that don't take place when the chemicals are just mixed together.

Bacteria are themselves living organisms and the scientific attack upon them is planned as an attempt to find a chemical molecule that will inhibit the particular enzyme that is necessary to growth of each kind of germ. This means that the chemists will have to build kinds of chemicals that resemble bacterial enzymes so closely that they join with them and put them out of business.

Disease fighting in a fundamental long-time sense has thus become a matter of delving into the molecular structure of substances, a research that at first blush might be considered far removed from curing the ill and fighting death.

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An alloy of iron and cerium is the so-called *flint* usually used in cigarette lighters.

In *muskrat farming*, ditches are sometimes dug in marshes to provide deeper water for the animals during winter weather; the ditches have no outlets.

PHYSICS

One Hearing Aid for All

Experts discovered from war research that a hearing aid can be made to suit almost all deafened persons. They will no longer have to be individually prescribed.

➤ CONTRARY to the present idea that hearing aids must be individually prescribed like eyeglasses, scientists at Harvard University have discovered that one hearing aid can be made which will suit almost all deafened persons.

Specifications for the "Master Hearing Aid", developed from war research on noise and communications, appear in a report, "Hearing Aids: An Experimental Study in Design Objectives," published by Harvard University Press.

"It is only a matter of time and continued research," says Dr. S. Smith Stevens, director of the Harvard Psycho-Acoustic Laboratory, "before a hearing aid is available which will meet all the demands imposed by most deafened ears. And with the improved fidelity in amplification will come new lightness, ruggedness and general economy."

The specifications proposed for the ideal hearing aid are:

(a) An overall acoustic frequency which is uniform and without sharp peaks or valleys. The lower cut-off frequency should be not higher than 400 cycles per second (cps) or lower than 200 cps. This frequency roughly approximates the pitch of middle "C" on the piano. The higher frequency cut-off, should not be lower than 3000 cps and can extend to 4000 cps. This latter frequency corresponds to four octaves above middle "C" on the piano.

(b) Between the cut-off frequencies of 300 cps and 4000 cps the overall slope of the frequency characteristic of microphone and earphone should rise toward the higher frequencies with a slope of 3 or 4 decibels per octave. A decibel is explained as a logarithmic unit of sound intensity. For instance, an airplane engine has an intensity of about 120 decibels while the buzz and hum in the average office is around 40 decibels.

(c) Maximum acoustic output should be limited so that the ear is protected against discomfort, pain or possible injury from powerful transients.

(d) The instrument must be sufficiently sensitive and free from electrical or other internally generated noise to allow it to render intelligible to a normal ear speech delivered to the instrument at a level not more than 10 db above the unaided threshold of intelligibility of that same normal ear.

(e) Acoustic gain (amplification) varies so widely that it is probably desirable to design at least two or perhaps three different models of hearing aids.

(f) The instrument must be provided with an effective gain control with a range of at least 40 db.

(g) There must be no squeal (electrical feedback) when the instrument is operated at maximum gain setting.

Supervisor of the research project was Dr. Hallowell Davis, former associate professor of physiology at Harvard and now director of research at the Central Institute for the Deaf, St. Louis; Dr. Stevens, and Dr. R. H. Nichols, associate director of the Harvard Electro-Acoustic Laboratory.

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PALEONTOLOGY

Beetle 8,000,000 Years Old Entombed in Amber

➤ SOMETHING over 8,000,000 years ago a long-snouted beetle very much like a modern pine weevil wandered over the bark of an evergreen tree in the Baltic flat-woods. It blundered onto an ooze of sticky gum, bogged down, and perished. The gum hardened into rosin, dropped off (perhaps during a rainstorm), was washed downstream and deeply buried in silt.

Ages later, East Prussian miners dug up the lump, now hardened into amber but still holding its entombed beetle, from a pit 90 feet deep. It was sent as a curiosity to Dr. Titus Ulke, veteran Washington, D. C., naturalist.

With L. L. Buchanan, U. S. Department of Agriculture entomologist, Dr. Ulke regarded the specimen with something more than curiosity. For the embedded weevil, though it resembled present-day insects in the genus Pissodes, was sufficiently different to be considered a distinct genus—something new under the sun of science. So Dr. Ulke gave it a new zoological name, *Paleopissodes weigangae*. The specimen is now in the Academy of Natural Sciences.

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ASTROPHYSICS

Sea-Level Observatory to Measure Sun's Radiation

➤ TO measure the effect of the lowermost and most humid layer of the earth's atmosphere on radiation coming through from the sun, the Smithsonian Institution is establishing a new astrophysical observatory at Miami, Fla.

Readings taken there will be compared with those from the Institution's already existing astrophysical laboratories, which are on high, dry mountaintops—one on Table Mountain in California, the other on Mount Montezuma in Chile. A site in Mexico is now being sought for a third.

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ENTOMBED BEETLE—An 8,000,000-year-old beetle found in a piece of amber uncovered by East Prussian miners. It is new to modern science. The photograph is considerably enlarged.

MEDICINE

Gene Theory Dims Cancer Conquest Hope

➤ CONQUEST of cancer is one of the most hopeless problems of science if the theory proves true that tumor growth is caused by changes in the form of the genes, which are the irreducible units of living systems.

Dr. George W. Beadle of the California Institute of Technology, in delivering a Silliman lecture at New Haven, Conn., in connection with Yale's Sheffield Scientific School centenary, explained that while the frequency of mutations of the genes can be increased in many ways, there is little immediate hope of decreasing them.

Progress in cancer research is discouragingly slow, he emphasized, although great sums of money are being spent and an impressive array of talent is directed upon this problem. The idea that change in the fundamental living bits that carry heredity is the fundamental cause of cancer is very discouraging and Dr. Beadle feels that makes scientists reluctant to look with favor on the idea.

Radiation from the atomic bomb, X-rays, cosmic rays, and even the ultraviolet light in strong sunshine are all known to be able to cause change in the inheritance of living things, human beings included. Radiations do this by changing the genes. Some of the changes may not show up until scores of generations have lived and died. This is the basis of some of the real fear that some scientists have of the genetic disaster for mankind and other living things contained in the atomic bomb.

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ASTROPHYSICS

Sun's Energy Measured By New "Langley" Unit

➤ WEATHER-MEN and physicists have a new scientific unit for use in measuring the sun's heating power—the "langley", abbreviated as "ly". It is named in honor of Dr. Samuel P. Langley, who was a pioneer student in this field as well as one of the founders of modern aviation. Formal notice of the adoption of the new unit has been given by a group of leading meteorologists and astrophysicists in a communication to the British science journal (*Nature*, Sept. 6).

Curiously enough, the adoption of the term "langley" was recommended in a German scientific publication, *Handbuch der Physik*, issued in Berlin during 1942, while the Hitler's Reich was at war with the United States. Nazi thought-controllers apparently overlooked that one.

A langley is defined as the amount of solar radiation received on one square centimeter, capable of raising the temperature of one gram of water one degree Centigrade. Phrases like "langleys per minute", abbreviated to ly/min, can be expected to appear in future scientific literature.

Signing the communication that formally sets up the new unit were: Loyal B. Aldrich, director, Astrophysical Observatory, Smithsonian Institution; Harry Wexler, chief, Special Scientific Services, U. S. Weather Bureau; Sigmund Fritz, meteorologist, U. S. Weather Bureau, L. F. Hand, official in charge of solar radiation section, U. S. Weather Bureau; Arnold Court, meteorologist, Office of the Quartermaster General, War Department; Maj. William P. Millen, Air Corps.

All the signers have headquarters in Washington, with the exception of Mr. Hand, who works in Boston.

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PSYCHOLOGY

Family Life Determines Character of Child

➤ LIFE with Father—and the rest of the family—determines the character and personality of Junior, three University of Chicago psychologists discovered in a study of 13-year-old children in a Midwestern town.

Most important part of family life, as far as building junior's character goes, is his sharing in family decisions. Next most important are the attitudes of the parents toward each other and their attitude toward the child's relations with his peers.

These findings are reported by Andrew W. Brown, Joan Morrison and Gertrude B. Couch in the *Journal of Abnormal and Social Psychology* (Oct.). Their work is a part of a study being conducted by the Committee on Human Development of the University of Chicago in a "typical small Midwestern town," referred to as "Prairie City."

A group of school children answered questions about their family relationships, while teachers, other adult leaders and the pupil's schoolmates rated their character in different tests.

Among ten phases of family life, sharing in decisions ranked highest in relation to character, but all ten were found to be a part of character-building.

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IN SCIEN

OPHTHALMOLOGY

One Donated Eye Gives Normal Sight to Two Boys

➤ A WAY to make two eyes see again for two boys through a single gift eye from a third person was described by Dr. George P. Landegger of Los Angeles at the meeting of the American Academy of Ophthalmology and Otolaryngology, in Chicago.

A rectangular piece of cornea, transparent part of the eye that admits light, was cut from a donor eye and divided in half. One of the squares thus formed was grafted into the eye of one boy and the other into the eye of another boy, each of whom had such advanced deformity of the corneas of their own eyes that not even contact glasses could help them to see.

The grafts healed perfectly and 11 months after the operation each boy had normal 20/20 vision.

Science News Letter, October 25, 1947

MEDICINE

Hope to Prolong Action of Penicillin with Metals

➤ PENICILLIN may be made more useful as a remedy by combining it with metals or with various organic dyes, Samuel Monash of New York suggests in a report to the journal, *Science*, (Oct. 17).

The greater usefulness would come from the fact that the mold remedy would stay in the blood longer when combined with a metal or a dye.

Metals inactivate penicillin, other scientists have previously reported. But Dr. Monash thought the inactivated penicillin might become active again after it gets into the body.

He tried it on rabbits. Penicillin in peanut oil, material generally used to slow penicillin escape from the body, could not be found in the rabbit's blood five hours after it had been injected. Penicillin combined with silver, mercury or iron could be detected in the rabbit's blood from 17 to 20 hours after injection. Much the same results were obtained when penicillin was combined with the dyes, brilliant green and gentian violet.

Science News Letter, October 25, 1947

NCE FIELDS

NUCLEAR PHYSICS

New Atomic Study Launched With Mass Spectrograph

➤ A NEW attack on secrets of the atom by researchers at the National Bureau of Standards in Washington may reveal whether man can unlock energy from other atoms than ones of the atomic bomb elements.

"A large new instrument of novel design" is planned "to indicate available atomic energy," the Bureau of Standards announced. This instrument will be a mass spectrograph. Being built at the Bureau in cooperation with the Office of Naval Research, the new instrument will give precise determinations of atomic masses.

The new spectograph will be so sensitive that it will measure the mass of the particles which make up atoms. Measured with the new instrument, these subatomic masses may solve some of the mysteries of the structure of atoms—and give new hints on where and how to unlock the energy in other atoms.

This new tool for atomic scientists is one job of a new atomic physics division being established at the Bureau. The six sections of the division will do fundamental research and set standards in atomic fields.

Dr. E. U. Condon, director of the Bureau, also will head the new division with Dr. Robert D. Huntoon, a Bureau scientist who worked on the radio proximity fuze, as assistant chief.

Science News Letter, October 25, 1947

OTOLOGY

Pure Lead Used to Keep Ear Window from Closing

➤ THE famous window cutting operation on deaf ears to let them hear again has been improved by a lead burnishing.

This new development in the fight against deafness was announced at the meeting of the American Academy of Ophthalmology and Otolaryngology in Chicago by Dr. Julius Lempert, New York ear specialist and surgeon who was one of the first to perform this operation in the United States.

The operation itself consists essentially in making a new window in the inner ear for the passage of sound waves. It is used in cases in which hearing is lost because of bone formation in the opening to the ear. This bone formation prevents the passage of sound waves to the nerve of hearing.

One drawback of the operation is the difficulty of keeping the new window open permanently. Covering the opening with a flap of scar tissue from the ear canal has been one method used.

Dr. Lampert's innovation is to burnish the rim of the new window with pure lead. When tried in monkeys, this prevented formation of bone, which would close the window again. He hopes that it will do the same in humans.

Science News Letter, October 25, 1947

MEDICINE

Stomach Cancer in Mice May Help Human Diagnosis

➤ CANCER of the stomach, which is the most frequent and highly fatal form of the disease in men, can now be experimentally produced in mice.

Confidence that this will lead to a better understanding of the disease in man and perhaps shed some light that will enable investigators to detect cancer of the stomach in its early stage was expressed by Dr. Harold L. Stewart of the National Cancer Institute, Bethesda, Md., who with Dr. Egon Lorenz reported his work to the International Cancer Research Congress.

Two powerful cancer-producing chemicals have been used to cause stomach cancer in the laboratory mice. But, whereas small injections of these chemicals are almost certain to produce cancer in four months, when given by mouth they have no effect on the glandular stomach. Mice were fed a dose of 20-methylcholanthrene, 350,000 times as high as that required to produce cancer by subcutaneous injection with this powerful chemical, without developing the disease. This again may be significant to man because suspicion has centered in the past on what was taken by mouth as a cause for the high rate of cancer in men.

Further studies will be made in an attempt to produce cancer in all strains of mice, to find a strain that is resistant to cancer and discover if possible what causes the resistance. The cells involved in the production of cancer will undergo intensive study and smears will be made of the cells shed in an attempt to discover a method for early detection.

Science News Letter, October 25, 1947

MEDICINE

New Blood Test to Aid in Treatment of Infections

➤ A NEW blood test that will help doctors give better treatment with penicillin or other drugs to patients suffering serious infections has been developed by Dr. Charles H. Rammelkamp, Jr., and Miss Margaret Hezebicks of Western Reserve School of Medicine, Cleveland, Ohio.

The test is for the staphylococcus, germ that causes boils but also such serious ailments as abscesses of the liver and kidneys, pneumonia, and osteomyelitis, or bone inflammation. If the doctor knows what germ is causing the trouble, he can tell better what medicine to give.

To make the test, a sample of the patient's blood serum is taken. To this is added a substance called coagulase, which comes from cultures of the staphylococcus germ. This is incubated and then fibrinogen, blood chemical that plays a part in making blood clot, is added. If there is no clotting, it shows that the patient has become infected with the staphylococcus.

Science News Letter, October 25, 1947

INVENTION

Car-Lifting Elevator Parks Autos Automatically

➤ PARKING six or eight cars where but one could be parked before is the alluring prospect held out by a Los Angeles inventor, Richard L. Sinclair, on whose automatic parking apparatus U.S. patent 2,428,856 has just been issued.

The apparatus consists of a car-lifting elevator which will carry a car driven onto its channelled tracks up to the level of an overhead stall. When it is opposite the stall entrance, the tracks slide out, carrying the car into the stall; then they slip out from under the wheels, leaving the car parked.

In its simplest form, the parking machine serves only two ranks of stalls. However, it is possible to increase the number by building the elevator tracks on a turntable, so that cars can be parked in radially arranged stalls, more or less like an old-time railroad roundhouse.

All operations are carried out by hydraulic mechanism, with electric controls centered at a single operator's station.

Rights in the patent are assigned to Park-O-Mat, Inc., of Los Angeles.

Science News Letter, October 25, 1947

ASTRONOMY

No Planets in Evening

But there will be plenty of bright stars during November evenings. The "Great Square," high in the south, is a good group with which to find the fall constellations.

By JAMES STOKLEY

➤ WHILE NO PLANETS are easily visible through the evening in November, there are plenty of bright stars to repay a study of the skies; and if you happen to be around in the early morning hours, some planets come into view. On the accompanying maps are depicted the appearance of the heavens at about 10:00 p.m., your local brand of standard time, at the first of the month. In the middle of November they will look the same way an hour earlier.

A good group with which to start finding the autumn constellations is that marked "Great Square," high in the south, part of Pegasus, the winged horse. Extending from the upper left hand corner of the square directly overhead is Andromeda, the chained lady. Below and to the left of the square one sees Pisces, the fishes; and below this is Cetus, the whale. To the right of these figures is Aquarius, the water carrier, and below this another fish is found—Piscis Austrinus, the southern fish, with the bright star Fomalhaut.

Bright November Stars

The brightest stars of the November evening skies, however, are found in two groups, one to the east and the other to the west. Just above the eastern horizon Orion, the warrior, is coming into view. First magnitude Betelgeuse is to the north, and Rigel to the south, of the three stars in a vertical row that mark his belt. Above Orion we find Taurus, the bull, with brilliant Aldebaran, red in color. About the same height in the east, and farther to the left, is Auriga, the charioteer, with Capella. Below this is Gemini, the twins, with Pollux as the brightest star.

In the northwest shines the northern cross, part of Cygnus, the swan, and with Deneb, another star of the first magnitude, at the top of the cross. Below it is Lyra, the lyre, with Vega, and to the left you will find Aquila, the eagle, with Altair.

At the beginning of the month the planet Venus will be too nearly in line with the sun to be visible, but by the end it will shine just above the southwestern horizon at sunset. During the later fall and winter it will become a most brilliant object in the western evening sky. Jupiter, which makes a close approach to Venus on Nov. 9, is also low in the southwest at sunset, and hard to locate, since it is fainter than Venus. Mercury is on the western side of the sun, so that it comes up in the east just before sunrise, and may be glimpsed at dawn low in the southeast.

Mars and Saturn

Mars and Saturn arise in the east about midnight, in the constellation of Leo, near the star Regulus. They are in that order from west to east and about equally spaced. The order will change during November, for on the 11th Mars passes within a degree to the north of Saturn, and on the 28th within two degrees of Regulus. The three objects can easily be identified by remembering that Saturn is the brightest, Regulus the faintest, while Mars is distinctly red in color.

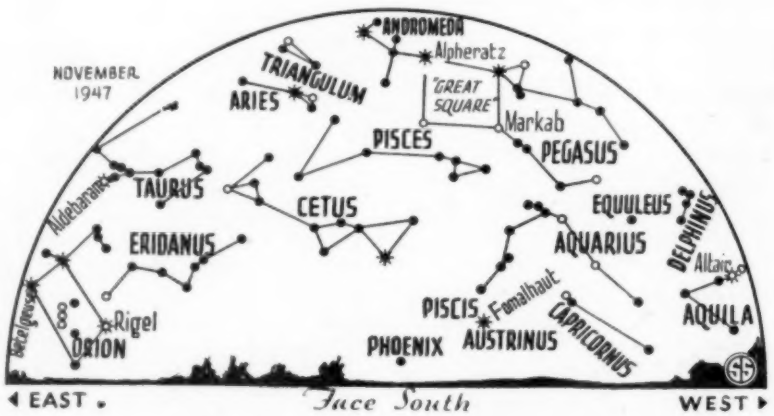
On the night of Nov. 16 this same part of the sky—the constellation of Leo, the Lion—will be a center of interest for from it will seem to emerge the meteors of the Leonid shower. Actually these meteors, or shooting stars, are bits of cosmic dust, moving through space in parallel paths. Like the tracks of a railroad, these seem to converge in the distance, towards Leo. More of these meteors will be seen after midnight than before, and perhaps one a minute will be visible when the shower is at its height. Of course, these are not stars at all, but tiny particles which enter the earth's atmosphere and disappear as they are burned up in a flash of light.

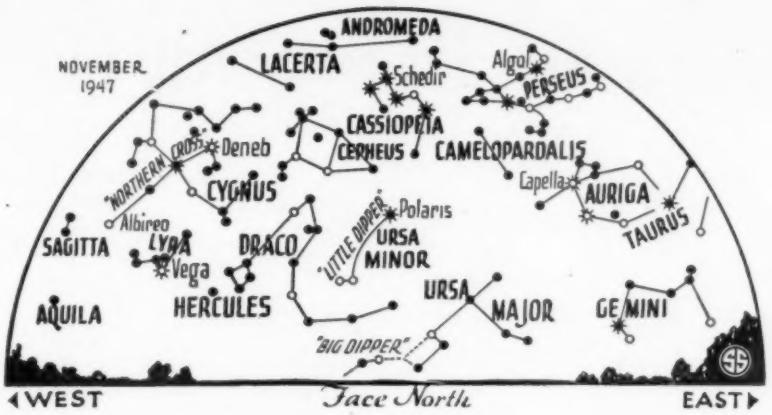
Eclipse of Sun

On Nov. 12 the second eclipse of the sun this year will occur, and unlike the first, on May 20, something of it will be seen in most of the United States. The earlier eclipse was of more scientific interest, however, for it was total. Then the moon's shadow swept across the earth along a track crossing South America, the Atlantic Ocean and Africa. Many scientists travelled to points along the path, and there the sun's disk was completely hidden by the moon, making possible many observations not feasible at other times.

The moon will be relatively farther away on eclipse day, Nov. 12, than it was in May, and it will look a little smaller—too small, in fact, to cover the sun completely. Thus there will not be a total eclipse even in places on the earth directly in line with the centers of the sun and moon. When the eclipse is at its height at these points, the dark disk of the moon will be visible with a ring of the sun's edge around it. Such an event is called an "annular" eclipse from the Latin word for a ring.

The narrow path along which the annular effect will be visible crosses the





Pacific Ocean to the coast of Peru and then ends in the jungle of Brazil. But over a much larger area one edge of the sun will be covered by the moon, and there a partial eclipse will occur.

The region of the partial eclipse covers the northern part of South America, except the extreme eastern part of Brazil; all of Central America; most of the United States and the western part of Canada. The only part of the United States where it will not be visible is that north of a curved line crossing Massachusetts, New York, Pennsylvania, Ohio, Indiana, Illinois and Wisconsin.

California will see the greatest eclipse, with about 40% of the solar diameter being covered in the region of San Diego. Farther north and east the eclipse will be less. At Denver, for example, the coverage will be only 14%. At Atlanta it will be 10%, and at Washington 4%. New York will get only 2% and Chicago 1%, hardly enough to be noted. Watching the sun through some protective screen, such as an exposed piece of photographic film, possibly a narrow bite will be noted in the sun's edge. The time of the maximum at New York will be 10:48 a.m., EST, and at Chicago 9:21 a.m., CST.

Time Table for November

Nov.	EST	
3	9:00 a.m.	Moon nearest, 229,400 miles
5	2:43 a.m.	Algol (variable star in Perseus) at minimum brightness
	12:03 p.m.	Moon in last quarter
	9:37 p.m.	Moon passes Mars
6	1:40 a.m.	Moon passes Saturn
7	11:32 p.m.	Algol at minimum
9	9:00 a.m.	Venus passes Jupiter
10	8:20 p.m.	Algol at minimum
11	1:00 p.m.	Mars passes Saturn
12	3:01 p.m.	New moon; annular eclipse of sun is visible in Pacific Ocean, partial eclipse visible over most of North America
13	7:39 p.m.	Moon passes Jupiter
14	5:25 a.m.	Moon passes Venus
16	Early morning	Meteors of Leonid shower visible
18	6:00 p.m.	Moon farthest; distance 251,500 miles
20	4:44 p.m.	Moon in first quarter
25	4:25 a.m.	Algol at minimum
28	1:14 a.m.	Algol at minimum
	3:45 a.m.	Full moon
30	1:00 p.m.	Moon nearest; 226,100 miles
	10:03 p.m.	Algol at minimum

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, October 25, 1947

ELECTRONICS

Printed Circuit Radios

Eleven-ounce two-way radios from which you can talk for a distance of 10 miles, to be offered public with private frequencies within the 460-470 megacycle range.

➤ ELEVEN-OUNCE two-way radio with which you can talk to your office or your home from a distance of up to ten miles is ready to go on sale as soon as the Federal Communications Commission sets up a licensing system.

A. Gross, president of Gross Electronics, Inc., Cleveland, showed his new instrument at a symposium in Washington on printed circuits. Flat, "printed" wires and other miniature parts make possible the new light-weight, civilian "walkie-talkie." Complete with batteries and antenna, the two-way radio is carried in a leather case in the way you carry your camera. Price of the new transmitter and receiver will be "less than $200 a pair."

They will be sold in pairs which are tuned to their own private frequencies, within the 460-470 megacycle range allotted to personal radios by the FCC. Each set will be licensed by the FCC.

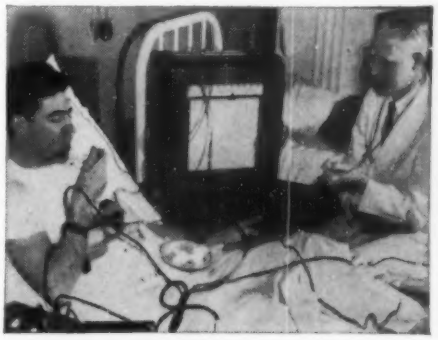
Another manufacturer will have a cigarette-pack-sized radio receiver using printed circuits on the market "in about a month," it was learned at the symposium. A hearing aid with light, compact printed circuits was also shown to the group of scientists.

New uses for printed wire in electronic circuits will range from radar to toys and games, Dr. Cledo Brunetti, engineer at the National Bureau of Standards predicted. Dr. Brunetti demonstrated his own small, printed-wire radios. He has built a transmitter in a lipstick and a radio receiver the size of a calling card.

A military leader, R. J. Framme, Wright Field, Ohio, engineer and member of the military aeronautical board which sponsored the meeting, declared that printed circuits and other rugged miniature parts are "the only thing" that can be used to get the small size and light weight needed for electronic assemblies on guided missiles, automatic aircraft and other military equipment using electronics.

Science News Letter, October 25, 1947

A tall tree close to a house usually, but not always, protects the building from *lightning*.



SPEEDOMAX Saves Time; Records Data Accurately

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Do You Know?

The best *dairy cattle* came originally from Asia, but were developed in the cool climates of Holland, Denmark, Scotland and the Channel islands.

Baled *cotton* in storage can be protected from ordinary sources of ignition by dusting with sodium bicarbonate; when exposed to heat from a spark or lighted match, it liberates carbon dioxide, a fire extinguisher.

Canadian *scientific industrial research* centers in laboratories operated by the Canadian National Research Council; the Council has a full-time civilian staff of about 1,500 persons.

A shield of treated wood is not sufficient protection against *termites;* these wood-destroying pests can build their tunnels across treated wood to reach wood that is unprotected.

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MEDICINE

Diseases Strike Unborn

More than 12 per 100,000 of the American population are crippled or killed by diseases that attack them before they are born.

➤ AMERICANS of the future are being killed at the rate of more than 12 per 100,000 population each year by diseases that attack them before they are born, the nation's health fighters, members of the American Public Health Association, were told.

The causes of this loss of life and the crippling among those who survive prebirth damage are "largely accidental and preventable," Drs. John E. Gordon and Theodore H. Ingalls of the Harvard School of Public Health declared.

The discovery that German measles in the mother during the first three months of pregnancy may cause many different defects in the baby, even blindness, deafness and deformities of the heart, has acted as a veritable ferment in medical research during the past decade. The discovery implied that there is an unfathomed relation between disease in the mothers and defect in the babies.

Many of the structural diseases of the human body may date back to a cause operating years before its full effects show themselves, it is now believed.

The usual preventive methods used by doctors caring for expectant mothers are not enough to insure perfect development. Further evidence for this and for the existence of an unsolved public health problem comes from the fact that about a third of the country's youth was unfit to meet the physical requirements for induction into the armed forces.

Influenza, smallpox, syphilis and typoid fever as well as German measles have been shown to play an important part as killers of unborn babies. Almost half of one group of expectant mothers who got 'flu during the 1918 epidemic died. Of those who survived, two-thirds lost their babies either before, at or shortly after birth.

Three significant points on the causes of defects in development before birth were stressed by the Harvard scientists. These are: 1. Unrelated agents acting during pregnancy may give rise to the same type of arrest. 2. Different types of defect may be caused by a single agent. 3. The resulting malformation can be expected to be a function of the stage of the unborn baby's development at which the cause or agent is active.

Two avenues of approach for further study leading to prevention of pre-birth deaths and defects were suggested: 1. search of maternity records to determine the responsible agent which produced a defective birth; 2. observation of pregnant women who have any form of infection and of the effects on the child when born.

Science News Letter, October 25, 1947

FOOD RESOURCES

Precious Meat Supplies Cut by Premature Deaths

➤ MEAT wouldn't be so scarce if so much of it were not allowed to die on the hoof without ever reaching market, headquarters of the American Veterinary Medical Association in Chicago pointed out. One way to increase meat supplies, both for home use and for relief shipment abroad, would be to stage an all-out campaign to stop the needless deaths of so many meat animals, dairy cows and poultry.

One-third of all pigs in this country die before they reach the packing-house, officers of the Association declared. One-fifth of all dairy calves die before they come of milking age. A quarter of all egg-farm pullets never get a chance to lay an egg. Parts of millions of hogs are condemned annually by inspectors because of tuberculosis, and careless shipping of liestock results in an estimated 75 million pounds of lost meat every year.

Science News Letter, October 25, 1947

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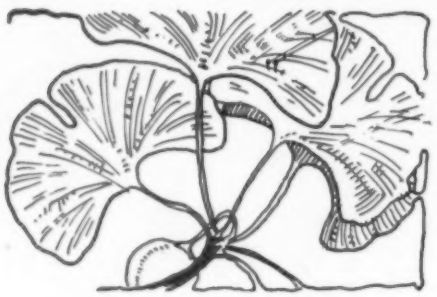
DENDROLOGY

NATURE RAMBLINGS

by Frank Thone



Living Fossil

➤ DINOSAURS belong to a past so remote that we are apt to think of them as inhabitants of another and fantastic planet. All the other backboned land animals of their time have vanished with them, and the vertebrate population of the earth has changed a dozen times over between their day and ours.

Yet if we could transport ourselves back into the woods that the later dinosaurs walked through, we would see leaves on many of the trees and other plants that would remind us strongly of "home". There would be things looking for all the world like elms, sycamores, cottonwoods, willows, walnuts, hickories, grapevines, beeches, birches, alders, hazelbrush—the list could be strung out to considerable length. Going even farther back are trees belonging to several conifer groups.

All these would look familiar enough, but there is one tree genus that has survived from that day down to this that strikes us as almost as much of an oddity, when we first see it, as would a live dinosaur. Presumably because it is now so exotic, the ginkgo looks to most of us like a fossil that has come to life.

Of the several genera and fairly numerous species in the once widespread ginkgo family, only one species, known botanically as *Ginkgo biloba,* is living today. It would probably have perished centuries ago, too, but for the fact that Chinese priests fostered it in their temple grounds. It has now become fairly well distributed as a street and park tree in this country, though it is still not as generally appreciated as it deserves to be.

A ginkgo tree has a somewhat columnar shape when young, becoming bushier as it reaches full size. Its glossy green leaves are wedge-shaped, usually deeply cleft. They turn a beautiful pale-gold hue in autumn. As an ornamental, the ginkgo has only one drawback. Male and female flowers are borne on separate trees, and the large-seeded, plum-like fruits that follow the female blossoms have a thin pulp that reeks like rancid butter. For this reason, only male trees should be planted—if you can be sure of their sex in advance.

A great virtue of the ginkgo is its almost complete freedom from the fungus disease and insect pests that bedevil practically all of our other ornamental trees. Perhaps the last thing that ever wanted to chew its leaves was a herbivorous dinosaur.

Science News Letter, October 25, 1947

YOUR

HAIR

AND ITS CARE

By O.L. Levin, M.D. and H.T.Behrman, M.D.

Two medical specialists tell you what to do to save and beautify your hair, stimulate healthier hair growth, and deal with many problems, as:

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OTOLARYNGOLOGY

Metal Throat Saves Girl

➤ A NEW spare part for the human body, an artificial throat made of vitallium metal, was announced by Dr. Sam H. Sanders of Memphis at the meeting of the American Academy of Ophthalmology and Otolaryngology in Chicago.

It was developed for a 10-year-old girl whose throat was almost closed by scar tissue. For months someone had stayed with her to keep her awake day and night because her mother was afraid she would stop breathing and die if allowed to go sound asleep.

After wearing the artificial throat for over seven months and a skin grafting operation, she recovered. Today, four years later, she is a perfectly normal girl with every prospect of a career as a singer. Nose and throat specialists at the meeting heard a record of her soprano voice which won a superior rating in a state high school contest.

The metal throat is technically termed an artificial oropharynx. The oropharynx is that part of the throat, below the soft palate, where the openings from mouth and nose come into the throat.

Scars from burns by caustics such as lye, diphtheria, syphilis and throat infections may close this part of the throat. In the case reported, the trouble started two weeks after her tonsils and adenoids had been removed. The operation was performed by a competent, well trained specialist. The little girl, J. M., was evidently one of those persons who are prone to develop an excessive amount of scar tissue for no apparent reason.

Since there are others who may have such trouble, Dr. Sanders suggested that the artificial throat may have further usefulness.

The appliance consists essentially of a jointed tube which is attached to the upper teeth and continues down the throat past the constriction. The mouth and throat sections were at first connected by welding a strap, or connecting bar, cast for this purpose, on each side. Later this was replaced with a ball and socket joint to allow free movement of the head in all directions.

The metal throat was used at first to prevent the scar tissue from growing back and drawing the throat together. Before the appliance was developed, this scar tissue had been repeatedly cut out, but always grew back rapidly.

After the appliance had been worn by the girl for seven months, it was removed and a piece of skin from her thigh was applied by collodion to sponge rubber glued to the vitallium tube. This was again inserted in the girl's throat. Two weeks later when the appliance was removed the graft had taken and there was a nice large opening in the throat. With the graft in the throat, there was no chance for scar tissue to grow over and close it.

Dr. O. H. King, a dentist, E. A. Denton, a dental technician, and Dr. Milton Adams, plastic surgeon, assisted Dr. Sanders in developing the metal throat and placing the skin graft.

Science News Letter, October 25, 1947

Books of the Week

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ASTRONOMY—William T. Skilling and Robert S. Richardson—*Holt,* 2nd ed., 692 p., illus., $4.75. This textbook, for a first college course in astronomy, has been revised along lines indicated by results of questionnaires which the authors sent to teachers using the first edition.

ESSENTIALS OF PHARMACOLOGY—Frances K. Oldham, F. E. Kelsey, and E. M. K. Geiling—*Lippincott,* 440 p., $5.00. A concise and effective introductory text, dealing fully with the entire field of pharmacology, in which general principles are stressed; drugs are discussed in groups according to functions.

EUROPE'S POPULATION IN THE INTERWAR YEARS—Dudley Kirk—*Princeton Univ.,* League of Nations Publication, 1946 II. A.8, 303 p., illus., $3.50, paper; $4.00, cloth. This fundamental demographic study explores the changing human resources of 27 European countries, measuring the basic regional differences in population characteristics, which significantly do not coincide with national or socio-economic frontiers.

GENERAL CHEMISTRY — Linus Pauling—*Freeman,* 595 p., illus., $4.25. An orderly presentation of descriptive chemistry and modern chemical theory, intended for college students whether or not they have had previous training in the subject.

THE GERMAN OILSEED INDUSTRY—W. H. Goss—*Hobart,* 248 p., illus., paper, $17.50. A well-documented treatise comprising an extensive study of the soybean oil industry in Germany.

HIGHLAND COMMUNITIES OF CENTRAL PERU: A Regional Study—Harry Tschopik, Jr.—*Govt. Printing Office*—Smithsonian Institution, Institute of Social Anthropology, Publication No. 5, 56 p., illus., paper, 50 cents. A discussion of the mixed and varied culture of the Central Highlands, including descriptions of physical setting, population, commerce and communication, as well as a detailed study of life in the respective communities.

HOW TO SPEAK EFFECTIVELY ON ALL OCCASIONS—George W. Hibbitt—*Halcyon House,* 308 p., illus., $1.98. Intended to aid the reader in increasing his ability as a speaker, this book includes sections on factors making for effective speech, various occasions requiring different types of speech, and the elements of composing speeches.

IS MARRIAGE NECESSARY—George A. Bartlett—*Pelican,* 179 p., paper, 35 cents. A Judge writes of marriage and its problems from his experience on the bench of the Reno divorce court.

MAYA EXPLORER—Victor Wolfgang Von Hagen—*Univ. of Okla. Press,* 324 p., illus., $5.00. Biography of John Lloyd Stephens, who rediscovered a lost culture in Central and South America, and became "the father of Mayaism."

THE METROPOLITAN LIFE: A Study in Business Growth—Marquis James—*Viking,* 480 p., $5.00. The story of the development of this biggest business in the world from a struggling private enterprise to a semi-public institution sponsoring health and welfare programs, housing developments, medical research and educational activities, and development of the field of industrial insurance.

THE PRACTICAL NURSE—Dorothy Deming—*Commonwealth Fund,* 370 p., $3.00. A comprehensive work on the functioning of the practical nurse in homes, hospitals, public health, and industry, with suggestions for expansion and improvement of her service in the future.

READING AND VISUAL FATIGUE—Leonard Carmichael and Walter F. Dearborn—*Houghton,* 483 p., illus., $5.00. Written for all those interested in the functioning of the eyes, this book not only summarizes existing literature but reports extensively on new experiments in the field, with high school and college students as subjects.

RESEARCH ON WAGES: Report of a Conference Held on April 4-5, 1947, at the Yale Labor and Management Center, prepared for the Committee on Labor Market Research—Lloyd G. Reynolds—*Soc. Sci. Res. Counc.,* Pamphlet 4, 41 p., paper, 50 cents. A summary of the conference discussion on several aspects of wage policy, with suggestions for further research in this field.

SCIENCE TEACHING—Arthur G. Hoff—*Blakiston,* 303 p., $3.75. Designed as an aid to the science teacher, this volume indicates for the instructor the means of preparing the student for adapting to a scientific environment and for utilizing intelligently the materials and facts of modern science.

SELF-HELP GEOMETRY WORKBOOK—H. D. Welte, F. B. Knight, and L. S. Walker—*Scott, Foresman,* 84 p., illus., paper, 72 cents. Developed to assist the student to a more thorough and full mastery of plane geometry, the workbook provides 34 drills on the major topics as well as discussion units for the more difficult subject matter.

A STUDY OF INDIVIDUAL CHILDREN'S DIETS—E. M. Widdowson—*British Information Office,* Medical Res. Counc. Special Report Series, No. 257, 196 p., illus., paper, $1.90. This survey made in the British Isles, analyzes the food consumption and values received by each child in selected groups.

TEST YOURSELF!—William Bernard and Jules Leopold—*Hellman, Williams*—94 p., illus., $2.00. The blurb on this book says: "Find out what makes you tick. Learn your strong points and your weaknesses. See yourself as others see you. . . If you dare!" Psychologists won't agree that anyone can take a short paper-and-pencil test, such as the 30 in this book, and tell whether he is a good lover, has esthetic taste, has superior judgment, etc.

TEXTBOOK OF BACTERIOLOGY—Thurman B. Rice—*Saunders,* 4th ed., 603 p., illus., $6.50. A practical textbook for those who seek an understanding of bacteriology without probing its more theoretical aspects.

TREASON'S PEACE—Howard Watson Ambruster—*Beechhurst,* 438 p., $3.75. The well-documented story of IG Farben, the German dye trust, from its origins in six small coal-tar dye companies to its recent position as a huge international and cartelized chemical combine having world domination as its ultimate aim.

THE USE OF THERMAL CONDUCTIVITY CELLS FOR GAS ANALYSIS IN STUDYING THE FISCHER-TROPSCH SYNTHESIS OF HYDROCARBONS — Edmond L. D'Ouville and K. Elizabeth Howe, 6 p., illus., paper. Free from: *Mellon Institute,* Pittsburgh, Pa.

Science News Letter, October 25, 1947

PHYSICS

Electrically Heated Glass Adds to Plane Safety

➤ A NEW glass, that conducts electricity and therefore can be electrically heated to keep it free of ice, is being installed in the control cabins of the new Boeing giant Stratocruiser passenger planes, in Seattle, Wash.

This glass, called Nesa and developed by the Pittsburgh Plate Glass Company, has inside and outside layers of plate glass with a layer of a clear vinyl plastic between. On the inside surface of the outer layer is a transparent but electrically conductive coating, whose composition is secret. By passing an electric current through the coating, regulated heat can be applied to the glass, keeping it ice and fog free at all times.

Science News Letter, October 25, 1947

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❁ *NEW PAINT, composed of pigment and polyvinyl resin dispersed in water with about 1% of a synthetic wetting agent, can be applied with brush or spray and dries without odor to a hard film in less than a half-hour. Washing and scrubbing do no harm to the dry paint, and it is stable to air oxidation.*

Science News Letter, October 25, 1947

❁ *TONGUE DEPRESSOR, similar to the familiar strip of wood used in examinations of the mouth cavity and throat, has a cavity near one end to hold a confection. The confection could be a candy for children, or a drug mixture if desired. The device was recently patented.*

Science News Letter, October 25, 1947

❁ *MOISTURE METER, to determine the moisture content of sand in bins and soils in the field, operates on the electrical conductivity of the material under test. Two arms of the device are thrust into the sand; one compresses the sand into a cup-shaped formation, the other sends a battery current through the pressed material.*

Science News Letter, October 25, 1947

❁ *SIGHT GLASS assembly, inserted in discharge tube of an automatic washing machine, permits the housewife to see the dirty water as it flows to the drain and note that successive rinse waters become clearer. It is a two-inch heat-treated glass cylinder with the necessary couplings.*

Science News Letter, October 25, 1947

❁ *FLUORESCENT WALL LAMP, a portable type that can be hung where needed and connected to an electric outlet by an extension cord, contains two 20-watt tubes shielded by a diffusing panel of frosted ribbed glass. It gives both direct and scattered light, as shown in the picture, and is usable from kitchen to bedroom.*

Science News Letter, October 25, 1947

❁ *HEARING AID selector permits the testing of a deafened person with a possible 140 combinations of component parts such as tubes, receivers and electronic circuits. The combinations are quickly switched from one to another until the one best suited for the particular deaf person is found.*

Science News Letter, October 25, 1947

❁ *SCREW ANCHOR, for holding screws in holes in glass, concrete and other hard material, is a plastic plug which has a lengthwise cross-arm opening in its center and lengthwise grooves on its outer surface. The plug is strong enough to be driven into a tight hole, within which it is firmly fixed by expansion when a screw is inserted.*

Science News Letter, October 25, 1947

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Question Box

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Photographs: Cover, Dr. Wilson Powell; p. 259, Westinghouse; p. 261, Yale University; p. 263, Ralph E. Lawrence.

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